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THE PRESCHOOL INVENTORY.

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THE PRESCHOOL INVENTORY BEGAN AS AN ANSWER TO THE NEED FOR SOME TYPE OF INSTRUMENT THAT WOULD PROVIDE AN INDICATION OF HOW MUCH A DISADVANTAGED CHILD, PRIOR TO HIS INTRODUCTION TO HEAD START, HAD ACHIEVED IN AREAS REGARDED AS NECESSARY FOUNDATIONS FOR SUBSEQUENT SUCCESS IN SCHOOL. MEASURING BASIC INTELLIGENCE WAS NOT THE GOAL. RATHER, THE INVENTORY WAS AN ATTEMPT TO DEMONSTRATE THE FACT THAT THE DISADVANTAGED CHILD WAS FUNCTIONING AT A DEFICIT AT THE TIME HE BEGAN SCHOOL. IT WAS ALSO TO BE USED ON A BEFORE-AFTER BASIS AND TO BE AVAILABLE AS AN INDEX OF EDUCATIONAL ACHIEVEMENT ASSOCIATED WITH HEAD START. THE AUTHOR CONCLUDES THAT THE INVENTORY SHOULD BE MORE SYSTEMATICALLY STANDARDIZED BEFORE BEING MADE AVAILABLE FOR PUBLICATION. (APPENDIXES INCLUDE THE INSTRUMENT AND AN ADMINISTRATION AND SCORING MANUAL.) (COD)

The Preschool Inventory

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Acknowledgements

The development of the Preschool Inventory must be unparalleled in the history of the field of educational and psychological measurement, and countless acknowledgements are necessary for any appreciation of how it developed. It was spawned in that phenomenal climate of social commitment, intellectual excitement, and inter-disciplinary cooperation that represented Project Head Start in the summer of 1965. The senior author can take credit only for the original idea, for the content of items, and for the supervision of the data analysis of the pilot sample. In fact, had it not been for her tenacity (which most colleagues would perhaps prefer to describe as intransigence) at holding on to the original idea and item content, the resultant product might well have been a better Inventory. Fortunately no data exist to support that possible inference, and she remains comfortable in her conviction that the original idea was a good one.

To Dr. Julius B. Richmond, National Director of Project Head Start, and to Dr. Edmund V. Gordon, Director of Research and Evaluation, go appreciation for their decision to use the Inventory nationally and their support during the field testing and preliminary standardization. Also appreciation is due to several persons from Dr. Gordon's office for their continued help throughout the summer, especially Mrs. Ann Ozer, Miss Vivian Horner, Miss Frances Green, and Mrs. Betty Rom. The Office of Economic Opportunity awarded a small contract for a preliminary data analysis, which made it possible for Mr. Donald Soule to work on the instrument during the summer of 1965. To Mr. Soule fell the task of refining the scoring system and shepherding through the computer all the preliminary data that could be obtained. The quality of his work identified him as much more than a statistical assistant and entirely justified his being made a co-author of the instrument. During this time countless numbers of persons in Washington and in the Office of the Bureau of the Census in Jeffersonville, Indiana, most of whom remained faceless and many of whom were even nameless, helped obtain necessary bits and pieces of information--like birthdays, which were somehow not included in the identifying data on the front page of the Inventory form. But in a way the greatest help of all came from persons who used the Inventory and who took the trouble to write the authors and comment on features that they considered good or bad and to express the conviction that the instrument helped to meet a major educational need.

In its first format the Preschool Inventory belongs to the Office of Economic Opportunity. No one, with the possible exception of the business men who sold the cars, crayons, and checkers, has made any profit from it. It is at present not copyrighted, and anyone is welcome to use it for legitimate educational or research purposes. Now that Head Start has successfully distorted all our ideas about what constitutes an adequate sample for statistical analysis, copies of tests given for other research projects would be appreciated by the authors for use in the further standardization of the instrument. Only when such a standardization has been carried out more systematically and less frenetically will the Inventory be copyrighted and made available for publication.

Introduction

The Preschool Inventory, at the time of this writing, is less than six months old; yet already it has quite a history and, it is hoped, something of a future. It began as a rather simple idea born during a conversation with the Medical Coordinator for the Syracuse, New York, Head Start program. Whether it was an idea "whose time had come" or one that somehow got out-of-hand is perhaps debatable at this point. However, the response of many people to the announcement of the existence of the entirely unstandardized, untried instrument seemed to offer evidence that, if its time had not already come, it certainly was not far away.

The birthing conversation dealt with the need for some type of instrument that would provide an indication of how much a disadvantaged child, prior to his introduction to Head Start, had achieved in areas regarded as necessary foundations for subsequent success in school. A measure of basic intelligence was not in any sense the goal, although it would be naive to assume that any such index of achievements would not be to some extent correlated with performance on intelligence tests. Nor was there any concern with the development of a so-called "culture-fair" test. It was taken for granted at the outset that the culture in the child's preceding years had not been entirely fair and that what was needed was not a procedure that would attempt to remove this unfairness but rather one that would permit it to show in all its blatancy. Also it was considered to be extremely important to demonstrate that the child from less favorable background was actually functioning at a deficit at the time he began school; this deficit had been assumed but not substantiated on a large scale. Then, finally but by no means least, it was considered important to develop a procedure that could be used on a before-after basis and be available as one index of educational achievement associated with Head Start. At least it was felt that it would be nice to have this sort of information for Syracuse!

An Educational or a Psychological Test?

It was difficult, if not impossible, to imagine a screening procedure which could be given to five- and six-year-olds with limited or no educational experience in anything other than individual sessions. As the procedure would hopefully be given to large numbers of children (rumors had begun to circulate that there would be 1500 children in the Syracuse program), these individual sessions could not be prolonged. Also it was essential that no fancy or expensive

equipment be required, as many of the programs would operate on limited budgets. Nor could the format of the individual items be too complicated, as machine scoring seemed inevitable. Also one needed to plan for the procedure that could be administered by persons with a minimum of sophistication in the fields of educational and psychological measurement, as it was not known at that time whether trained psychologists would be available to carry out the assessments. Thus, any inventory that might emerge had to possess the virtues, questionable though they might be, of easy-to-learn administration, no expensive equipment, a minimum of open-ended items requiring subjective interpretation, and a scoring system that could be easily and quickly computerized for data reduction and analysis. And, most important of all, it had to be put together in approximately two weeks!

It was probably the last consideration that had the greatest influence on subsequent events and that shaped the decision to compile an educational rather than a psychological test--if there can be any real distinction between these two categories of assessment procedures. That is, when a classroom teacher wishes to know how well her pupils are functioning in a given area, she gives them a "test." At such times she is usually not concerned with how her children compare with those in other parts of the country, or with the split-half reliability of her home-made test, or with the fact that she cannot know anything about how well children of comparable age and backgrounds who, for some reason or another, are not enrolled in her class might do. Rather she accepts her test at face value, as it were, and makes the comfortable assumption that it will describe for her each child's current level of functioning. She further assumes--perhaps gratuitously--that if she gives the same (or a very similar) test a few weeks or months later, that any change in score will reflect the child's growth under her tutelage. She realizes that she cannot rule out the fact that the part of a child's hypothetical increment might be related to information derived from his parents or from television or other sources. But, if he shows some progress, she will probably feel comfortable that she is not doing a bad job.

Such, it was felt, should be the strategy of the Preschool Achievement Test (as it was referred to in those days), and such would be its limitations. That is, on the basis of what was then known about potential Head Start Programs, it was not clear whether or if any sort of control group measurement would be feasible. Nor was it known whether any training or supervision of

test administrators would be possible. But it was felt that the instrument would have some merit as a means for each teacher to get to know the performance pattern of each of her children as a means of helping to formulate individualized classroom goals and, further, as a means of objectifying the amount of progress shown by each child. These considerations led to the suggestion contained in the original version of the Inventory that it be administered, if possible, by each child's own teacher. The fact that this was not possible in all programs in no way changes the original intent that the Inventory be regarded more as an educational (achievement) than a psychological (ability) procedure and that it be interpreted as a measure of performance rather than potential.

Preschool Achievement or School Readiness?

Is an inventory of preschool achievements the equivalent of an estimate of school readiness? A number of colleagues asked the senior author this question upon learning of her attempts to put together some sort of useful inventory. At this point it should be stated that, at the outset, the ambitious goal of developing a school readiness predictor was not explicitly formulated. Yet obviously if one is attempting to evaluate the array of achievements which the child brings with him to kindergarten or first grade, one is obviously interested in school readiness. The readiness concept is a tricky one, however, which makes too many assumptions about the experience for which one is presumably measuring. A child might be ready for one type of kindergarten and definitely not ready for another type. Furthermore, one cannot expect to demonstrate readiness without permitting a child to move into the criterion situation and function there for a fairly long time before ascertaining retrospectively whether he had been ready. Thus, in the present instance, it was decided to concentrate on specific achievements representing what the child brought with him to the educational experience rather than on broad areas of cognitive functioning that might predict how well he would do in the future. If this "preparedness" represents "readiness," then indeed the anticipated Inventory was intended to measure school readiness.

Selection of Areas of Assessment

Although exigencies of the proposed program forced the ruling out of certain types of items which might have been useful in such an Inventory, they could not be particularly useful at ruling in others. Accordingly, in an attempt to obtain

some quick guidelines for item development, the senior author examined a number of curriculum manuals for kindergarten programs, and spent some time observing in kindergartens, taking note of skills that the children were implicitly assumed to possess in order to function in the various classroom activities. Also, on the basis of her work in a nursery school for pre-kindergarten disadvantaged children, she observed areas of deficit that seemed to need a great deal of compensatory effort on the part of the teachers. Into these observations were assimilated points mentioned in some of the early memos and news releases distributed by various persons involved in the planning for Project Head Start. For example, it was mentioned that many of the eligible children were unable to give basic information about themselves and that they had a very negative self-concept. It was stressed that their experience was often so limited that they were unable to interpret simple instructions given them by the teacher. They were described as often having great difficulty in working with crayons or paints partly because they had never had the experience of holding such things as crayons or pencils. Their perception of authority figures was described as negative and restrictive rather than positive and supportive. Concepts of number and quantity were described as often totally undeveloped.

All these considerations, assimilated into the author's interpretation of literature in the field of child development, suggested the compilation of a series of items that would hopefully measure the child's performance in the following areas: basic information and vocabulary; number concepts and ordination; concepts of size, shape, motion and color (I); concepts of time, object class, and social function (II); visual-motor performance; following instructions; and independence and self help.

A series of 161 items hopefully measuring a young child's development in these areas was put together in April of 1965. In line with the thinking expressed here the questions were designed to assess the amount of information that a child had acquired prior to his induction into a pre-kindergarten program. The result was labeled the Preschool Achievement Test. As Dr. Julius B. Richmond, the National Director of Project Head Start, was a colleague of the author's, and as he had expressed interest in finding some instrument that might be used in assessing the initial functioning of the children admitted into the program as well as possibly indicating something about their response

to the intervention experience, a copy was sent to him in Washington. Almost immediately, however, the author realized that other work commitments would prevent her from doing anything more with the instrument, and it was temporarily forgotten.

Shortly thereafter Dr. Edmund V. Gordon assumed the position of Director of Research and Evaluation of Project Head Start and began to give some consideration to the selection of an appropriate instrument which might be useful in evaluating learning progress associated with Head Start attendance. Apparently some consideration was given to the possible use of one or another of the standardized school readiness tests (1, 2, 4, 5), but several consultants expressed the opinion that these could not be successfully used with children so young and so unfamiliar with assessment procedures. None of the well-known individual tests of intelligence or other cognitive abilities (6, 7) seemed to be the logical choice for a before-after evaluation of an intervention program planned to last only six to eight weeks. Also there was the tactical problem of the fact that use of such instruments would require large cadres of trained personnel, and many of the anticipated programs were to be held in areas where there were no psychologists qualified by training or experience to administer the standardized instruments. It began to appear that, apart from the major metropolitan centers where large numbers of professional persons might be concentrated, any assessment would probably need to be carried out by the educational personnel or by minimally trained volunteers. Also, it was reasoned, what was needed was an instrument that was sensitive, rather than resistant, to change. And finally, as someone remarked at a meeting for Head Start training coordinators, it had to be a procedure that no one cared too much about, as a really good instrument might well be ruined by what was in store for it!

When Dr. Gordon saw the preliminary version of the Preschool Achievement Test, he felt that it had possibilities. However, if it were to be used nationally, preliminary standardization was essential. Thus the author, who had in effect withdrawn from the local scene because of the pressure of other work, found herself deeply committed to the original task on a larger scale than had ever been imagined at the outset.

The Field Testing

In May a number of trained examiners (mostly candidates for an advanced degree in psychology) came to Syracuse at the request of the Research and Evaluation Office of OEO[1]. The purpose of this meeting was to discuss

the strategy of the instrument and to receive some training by the author in its administration. On the basis of this preliminary meeting the format of some of the items was changed slightly, and several alternate versions of the total scale which varied the internal order of items were prepared. With only one full day of intensive work, these young people then went into a fairly large number of communities and tried out the assessment with potential Head Start children. Areas represented in this field testing included New York City, Baltimore, Chicago, Los Angeles, an Indian reservation in North Dakota, rural children in Mississippi, and children in Syracuse. Altogether, approximately 300 children were examined in this preliminary period. A second meeting was scheduled in Syracuse for all the examiners as soon as they completed their assigned number of assessments. At this second meeting what can best be described as a "clinical item analysis" took place, with each participant arguing for or against the value of certain items or certain aspects of the overall procedure. This session was extremely helpful in minimizing ambiguity of items, in changing the order slightly so as to maximize the chances of eliciting a response, and in removing some items altogether. At this session several of the participating examiners expressed some discontent with the instrument, arguing especially that one "could not tell what it was measuring." For example, if a child could not point to a red crayon, the examiner had no way of knowing whether this failure was due to his fear of persons in authority or whether he really did not know the color red. Or similarly, if a child could not tell whether a mosquito or a grasshopper was bigger, the examiner did not know whether this failure was due to the fact that he did not know the word, "mosquito" or "grasshopper" or did not have the concept "bigger." In such arguments the author held firm to her original strategy which called for looking at the gross response the child could make, assuming that this would represent the kind of behavior his teacher and others charged with the responsibility of helping him learn would also be able to observe.

At this meeting a number of undoubtedly helpful changes were made in the format of the instrument. As, on the basis of quick inspection and simple item count, there appeared to be no difference in total number of items correct as a function of the order of item administration, an order was settled upon which, it was felt, minimized fatigue and kept interest at a maximum. One very encouraging finding from all the field testing areas was that children appeared to enjoy

the procedure and that it provided a good situation for sitting down and talking to a young child. At this session also a representative of the Office of Research and Evaluation for Project Head Start asked to insert the Draw-a-Man item into the instrument, primarily because this provided a place and a constant procedure for obtaining this example of the child's visual-motor work. As the first version had a shortage of visual-motor items, it was decided to use the drawing and develop a simplified scoring system for it. Also at this meeting permission was requested to change the name of the instrument from the Preschool Achievement Test to the Preschool Inventory. On that point the author gave in reluctantly and still feels ambivalent about the wisdom of having deleted the word "Achievement" from the title.

It had been planned that a complete statistical analysis of these 300 tests would be carried out. However, it soon became obvious that the changes made that day, and agreed upon by the participating examiners, made a complete analysis of the booklets obsolete. That is, these booklets could not be used for the provisional establishment of norms if any items had been changed or deleted. Thus these initial field test booklets were used primarily for the development of scoring procedures, for getting information about the range of anticipated responses (e.g., as in the number of objects likely to be named in the word fluency items), and for developing guide lines for scoring of semiqualitative items (such as the "What does a _____do" type).

But the main inhibitory factor was that there was simply no time. If the instrument was to be printed in time to be distributed for use in the second week of the Head Start program, it had to be released almost immediately. At this point the author almost backed out, for the preposterousness of the whole undertaking suddenly overwhelmed her. It was probably the thought of releasing the instrument to the OEO printing office that produced the panic; as long as it had remained in mimeographed form everything seemed all right. Also the immensity of the anticipated numbers involved began to sink in. For one to whom an N of 100 had always seemed too good to be true, the thought of obtaining the responses of 200,000 children was quite incomprehensible. Also, it is to be confessed, the author developed some qualms about her reputation as a scientist. What had started as an act of community service--for the author had decided to "volunteer" her idea after reading that Head Start would welcome the services of thousands of nonprofessional volunteers--had suddenly metamorphosed into something in which her scientific reputation was being laid on the line. It was not a very comforting thought.

Statistical Analysis

The goals of the statistical analysis were as follows: (1) to determine the internal consistency of the instrument; (2) to carry out an item analysis using biserial r and percent passing; (3) to obtain intercorrelations among scores on the a priori subtests and the total score; (4) to develop subtest and total scores by age group; (5) to carry out a factor analysis based on logical unit groupings within the scale; (6) to prepare a shortened form of the instrument.

In order to carry out these goals a sample of completed Inventories was needed. As the 300 booklets from the pilot study were not suitable, the most expeditious procedure appeared to be to obtain completed booklets from the first administration given to several groups of Head Start children. Through the cooperation of various staff members in the Office of Research and Evaluation of Project Head Start[2], some 311 booklets were sent to us. A major difficulty quickly arose in utilizing this material, however, as in the final development of forms in Washington, the child's birthdate had been omitted from the Inventory booklet. As the remainder of the data about this subgroup of children had not at that time been coded and stored on tape, it was extremely difficult to obtain the exact ages of the children whose Inventories were made available. However, absence of this information did not significantly delay the analysis, as a good deal of time was needed to refine the scoring and computational procedures. By the time the work in Syracuse had reached this stage, many letters were coming in from Centers in various parts of the country indicating the desire of local personnel to use the instrument and keep a copy of the results for their own records. Accordingly, even though it seemed premature to do so, a supplementary manual which would facilitate uniform scoring was written and distributed to personnel in Head Start Centers wishing to use the test for local data analysis. Subtests were established on the basis of the a priori hypotheses as to logical groupings of the items rather than waiting for the planned factor analysis. Also a simplified scoring format for the Draw-a-Man item was developed, as most people wished to regard this as one of the items of the Inventory.

By the time all the available booklets were scored, birthdates had been received from the Directors of local Head Start units for 158 of the children. Later in the summer 112 additional booklets containing birthdates were supplied,

making data from 270 children available for the establishment of age norms. However, for all statistical analyses in which age groups were not treated separately, only the original sample of 311 booklets was used. As sex of child was not identified on the forms, no analyses of sex differences could be done. Not every item was scorable in many of the booklets, and total scores could be computed for only 171 of the 311 children. However, a computer program for the analysis was used which would permit utilization of as much information as was available within a given booklet.

Internal consistency--split-half reliability

As a measure of the reliability of the test, all items were scored on a pass-fail basis and split into two halves by the odd-even method. Product-moment correlations were computed, with correction for length made by application of the Spearman-Brown formula. As thus computed, the split-half reliability of the instrument in its summer of 1965 form is .97. It is thus obvious that reliability is quite high, a fact which leads one to the anticipation that the test can be reduced in length without a significant loss of information.

Analysis of item difficulty

As relatively little information is available about the skills brought to the educational environment by disadvantaged children, a simple calculation of the percentage of children passing each individual item on the Inventory was calculated. In addition, information was needed about the reliability of individual items in relation to subtest scores and to the total score. As many people have expressed an interest in comparing the percentage of children in their local groups who succeeded on specific items with other groups from similar economic and social backgrounds, the table of percent passing is presented in its entirety in Appendix A. For the figures on percent passing the sample has been broken into three age groups--four-, five-, and six-year olds. Included in the same table are biserial correlations based on pass-fail

for each individual item so scorable and the total score computed for the 171 children who were given the complete Inventory.

Intercorrelations among subtests

In Table I are presented the intercorrelations for the subtests of the Inventory.

Insert Table I about here

From Table I it is obvious that there is a fairly high degree of correlation among all subtests, with the "Independence and Self-Help" subtest standing out as somewhat different. As noted above, the sample available for this subtest was generally the smallest of all in that many administrators of the instrument felt they did not have enough information to score those items. Also some people apparently did not realize that those items were part of the total Inventory. However, this lower correlation on items that represent self-help follows the general pattern observed in other work (3). The Vocabulary and Information, Number Concepts, and Concepts I and II subtests all bear a very high correlation (.84 or above) with the total score. The Visual-motor, Following Instructions, and Independence and Self-Help subtests stand out as being less related to the remainder of the subtests and also less related to one another.

Subtest and total scores for all subjects and different age groups

The range of ages of children seen in the Head Start Programs was quite restricted--approximately 4-6 to 6-6. In the sample of booklets sent to the authors for analysis, the number of children who had not reached their fifth birthday was extremely small, accounting for only 17 of 153 cases for whom birthdates and complete protocols were available. As it was deemed hazardous to submit any sort of age norms (which users of the instrument all over the country were requesting)based on such a small subsample, an attempt was made to

secure additional booklets and birthdays from OEO. Accordingly, prior to the analysis of any data as a function of age, 112 additional protocols and birthdates were obtained and scored, bringing to a total of 270 the group whose ages were known and whose tests were complete. In addition there were 102 completed protocols for children whose exact ages were unknown but who were known to be eligible for Head Start and thus within the 4-6 to 6-6 range. Accordingly, for the presentation of means and standard deviations the entire scorable sample of 372 children given the Inventory within the first two weeks of the Head Start education program has been used. These data are presented in Table 2.

Insert Table 2 about here

It had originally been planned to convert these raw scores into standard scores with a mean of 50 and a standard deviation of 10, with separate conversion figures for each of the four age groups. However, as the number of protocols available for analysis was considerably smaller than originally anticipated, it was decided to forego the calculation of such scores. In lieu of such standard scores, a table based on medians and quartiles for each of the subgroups has been prepared to serve as a temporary interpretive guide. These figures are presented in Table 3 and should suffice for anyone wishing to interpret local data.

Insert Table 3 about here

No more refined analysis of age trends for the original subtests or total score is contemplated at present, as the authors plan to use the revised form of the scale for all future work.

Factor Analysis

In order to factor analyze the Inventory, some kind of item grouping finer than that involved in the arbitrary subtests was required. Accordingly, the test items were grouped into 20 logical units, with each unit consisting of all the items of a particular type presumably varying only in item difficulty(3). For example, the eight items (92-99) asking the child to name the colors red, yellow, purple, etc. comprised one such unit. The six items (100-105) asking the child to tell what color certain objects were comprised another logical unit, even though both sets of items had originally been developed to go into the overall category of color concepts.

A principal components factor analysis on these logical units was carried out using the Tsar-Ivan program package used in the Syracuse University Computing Center. This program is an adaptation of a program by A.W. Bending of the University of Pittsburg. Initially the program was run, using unity on the diagonal elements, until a latent root of less than 1.0 was obtained. The test was found to be quite homogeneous, with very high loadings on the first factor. However, four factors could be extracted with a latent root greater than 1.0. These four factors were then rotated, using the Verimax criterion, so that the factors could be more easily defined.

In Table 4 are presented the factor loadings and communality (h^2) for each of the logical units

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Insert Table 4 about here

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used in the analysis. With one exception (logical unit A) the pattern of loadings left little doubt as to the correct factor placement of a given test unit. The obtained factors have been designated as follows:

Factor 1. Concept Activation. This is the factor that accounted for the greatest amount of common variance. The concepts involved seem to represent two major categories: ordinal or numerical relations, and sensory attributes such as form, color, size, shape, and motion. The activation involves either being able to call on established concepts to describe or compare attributes (relating shapes to objects, color-names to objects or events) or to execute motorically some kind of spatial concept (reproduction of geometric designs or drawing the human figure). High scores on this factor involve being able to label quantities ("How many" questions), to make judgments of more or less, to recognize seriated positions (first, last, middle), to be aware of certain sensory attributes (shape, size, motion, color), and to be able to execute certain visual-motor configurations (geometric forms, draw-a-man).

Factor 2. Independent Action. The group of 13 items representing the ability of the child to take independent action in the areas of dressing, keeping clean, and moving about the neighborhood seem on the surface to carry the meaning of this factor. At first the almost equally high loading of the items involving drawing a line from one object to another in response to a verbal request seems difficult to interpret. However, success on both types of items requires comprehension of simple words likely to be in the child's every-day vocabulary plus the ability to act independently. Thus, although the factor appears to be largely a practical one (as the items were intended to be), it is not devoid of cognitive content. It is possible that the clustering of these two units is due in part to the fact that all six items in Unit R ("Draw a line from ___to ___") were too easy for most of the children, with percent passing ranging from 83 to 95 for the entire sample.

Factor 3. Personal-social Responsiveness. This factor appears to involve knowledge about the child's own personal world (name, address, parts of body,

friends) and his ability to establish rapport with and respond to the communications of another person (carrying out simple and complicated verbal instructions given by an adult). Perhaps more than any other factor, it represents the type of eminently practical ability which the Inventory was originally designed to assess.

Factor 4. Associative Vocabulary. This factor requires the ability to demonstrate awareness of the connotation of a word by carrying out some action or by associating to certain intrinsic qualities of the underlying verbal concept. Item units having high loadings include simple labeling of geometric figures, supplying verbal or gestural labels for certain functions, actions, events, and time sequences, and being able to describe verbally the essential characteristics of certain social roles. It is of interest to note that many of the specific deficits frequently attributed to culturally deprived children cluster in this factor.

The factor analysis to some extent supported the a priori item groupings, but, as one expects of this statistical procedure, much additional information about the meaning of the items and their intercorrelations emerged. For one thing, the number of subtests was reduced from seven to four. For another, the way in which the conceptual factor saturates all other aspects of test performance became apparent. Thus the original goal of developing items that would tap prior achievements that should affect success in classroom performance in eminently practical ways probably has resulted in the compilation of an inventory highly saturated with a conceptual factor which, though related to practical experience, is probably even more influenced by the general level of cognitive maturity of the child. However, only subsequent validity studies can definitively answer that question.

Preparation of a Shortened Form

The item analysis and factor analysis just described made the job of shortening the instrument an easy one. A first selection involved eliminating

Factor 2 (Independent Action) altogether. This factor was, in the first place, represented by the smallest number of logical units analyzed and depended for its scoring on information about the child's performance outside the examining situation that might not always be available. It was obviously not always available in the 1965 sample, as witnessed by the fact that in only about two-thirds of the original 311 booklets were these items answered. To represent the remaining three factors we chose items which varied in item difficulty (percent passing), ranging from very easy to fairly difficult, which appeared to have good correlation with the total score (biserial correlation), and which were known to be appealing and interesting to children (examiner experience). As Factor 1 (Concept Activation) accounted for the greatest amount of common variance, contained the greatest number of logical units, and appeared to be composed of two sub-factors (numerical and non-numerical concepts), it was given double representation on the shortened version, with the items measuring some type of numerical concept separated for the convenience of test users from those sampling sensory concepts.

The items thus chosen to represent the three factors were, for the convenience of all future users of the instrument, placed contiguously. The final item arrangement within factors was chosen so as to try to maximize interest and minimize fatigue for the child. The factor representation of all items placed in the new version of the Inventory is as follows:

Factor 3--Personal-social Responsiveness. Items 1-26.

Factor 4--Associative Vocabulary. Items 27-47.

Factor 1A-- Concept Activation; Numerical. Item 48-66.

Factor 1B--Concept Activation, Sensory. Items 67-85.

The resultant Inventory takes no more than fifteen minutes to administer to most children. It still has high interest value for young children, including three-and four-year-olds. On the original standardization sample of 171 children, correlation between score earned on the original version and the shortened version is .98. Thus it appears that it is possible to shorten the instrument by about one half and still retain much of the information contained in the longer version. Split-half reliability of the shortened version, corrected by the Spearman-Brown formula, is .95. It should be noted that these correlations are based entirely on the original sample available to the investigators; they do not refer to a cross-validation sample, as would be desirable. However, additional information about the internal characteristics of the shortened version should be available within the near future. Detailed instructions for administration and scoring of the new Inventory are presented as Appendix B.

Future Research

At present the authors are collecting data needed to refine and complete the standardization of the instrument. This involves examining large numbers of three-,four-,five-, and six-year-olds representing a wide range of socioeconomic backgrounds. Children with and without preschool experience are being included in this new sample. Also an attempt is being made to follow children during their kindergarten year who participated in Project Head Start and others who were eligible but did not participate. Included in current activities are validity studies, in which subsequent success in school is related to early performance on the Inventory. The authors wish to maintain a registry of research in which the Inventory has been used and would be pleased to receive copies of any such studies, published or unpublished.

Footnotes

1. The authors wish to express particular appreciation to Miss Norma Graham for her assistance in securing these birth dates.

2. The following persons participated in the field testing phase and made many helpful suggestions about rewording of instructions and inclusion or elimination of preliminary items: Dieter Blindert, Ellemae Branstetter, Rhita De Vries, Esther Fink, Constance Fries, Joanne Guidici, Elsa Hjertholm, Vivian Horner, Jane Ingling, Raye Isenberg, Alice Jones, Mary Kawash, Antoinette Kramer, Richard Kramer, Jane Lathrop, Stanley Moldovan, Carole Pina, Sue Prescott, Michael Stroud, Len Unterberger, Mary Varela, Carol Wills.

3. Items 37 and 91 were omitted in the factor analysis. Both of these items, however, were used in the calculation of subtest and total scores, as indicated in the scoring manual distributed to interested persons during the summer of 1965.

Table I

Intercorrelations among subtests of the Preschool Inventory.*
(N for correlations ranges from 171 to 302)

	COUNT	CONC 1	CONC 2	VISMO	FOLIN	INDEP	TOTAL
VOCAB	68	75	69	54	56	35	86
COUNT		78	65	58	56	40	87
CONC 1			73	66	57	36	93
CONC 2				46	50	33	84
VISMO					40	40	72
FOLIN						26	68
INDEP							44

*VOCAB is subtest "Basic Information and Vocabulary."

COUNT is subtest "Number Concepts and Ordination."

CONC 1 is subtest "Concepts I."

CONC 2 is subtest "Concepts II."

VISMO is subtest "Visual-motor Performance"

FOLIN is subtest "Following Instructions."

INDEP is subtest "Independence and Self Help."

Table 2 Means and Standard Deviations for Standardization Sample

Variable	N	Mean	Standard Deviation
Information and Vocab.	387	35.57	7.61
Numerical Relations	389	23.78	6.85
Concepts I	389	40.51	11.25
Concepts II	374	27.29	7.94
Visual-motor	389	31.28	10.80
Following Instructions	389	30.38	5.70
Independence-Self Help	389	31.30	7.46
Total	372	219.65	44.68

Table 3 Age Norms for Interpretation of Preschool Inventory Subtest and Total Scores

Age 4-6 to 4-11 (N=31)

	Inform Vocab.	Number	Concepts I	Concepts II	Visual-Motor	Following Instruct.	Self-Help	Total
Superior	36-49	22-36	38-57	28-42	25-36	32-38	31-39	194-315
High Average	31-35	19-21	33-37	22-27	19-24	28-31	28-30	179-193
Low Average	26-30	14-18	23-32	19-21	15-18	23-27	22-27	150-178
Low	0-25	0-13	0-22	0-18	0-14	0-22	0-21	0-149
5-0 to 5-5 (N=51)								
Superior	41-49	27-36	48-57	32-42	37-42	35-38	37-39	234-266
High Average	35-40	22-26	40-47	26-31	29-36	31-34	31-36	216-233
Low Average	32-34	16-21	27-39	22-25	23-28	24-30	25-30	178-215
Low	0-31	0-15	0-26	0-21	0-22	0-23	0-24	0-177
5-6 to 5-11 (N=97)								
Superior	42-49	29-36	49-57	34-41	41-52	35-38	37-39	250-297
High Average	37-41	24-28	44-48	29-33	35-40	31-34	34-36	223-249
Low Average	32-36	20-23	34-43	24-28	25-34	27-30	28-33	196-222
Low	0-31	0-19	0-33	0-23	0-24	0-26	0-27	0-195
6-0 to 6-5 (N=91)								
Superior	42-49	31-36	52-57	36-42	45-52	36-38	37-39	264-300
High Average	38-41	27-30	48-51	33-35	39-44	33-35	34-36	243-263
Low Average	34-37	23-26	39-47	25-32	29-38	30-32	31-33	216-242
Low	0-33	0-22	0-38	0-24	0-28	0-29	0-30	0-215

Table 4

Factor Loadings for Logical Units within the Inventory

Item Nos.	Logical Unit	1	2	3	4	h^2
1-2, 4-10	A Personal-social Information	209	419	415	407	0.5565
11-20	B Parts of Body	346	066	683	295	0.6773
21-38*	C Quantities	560	359	247	429	0.6876
39-42	D More-less	621	222	178	092	0.4749
43-47	E Position	652	139	164	275	0.5468
48-51	F Positional Vocabulary	377	020	082	685	0.6180
52-55	G Geometric labeling	477	026	128	530	0.5261
56-59	H Visual-motor, Shapes	597	330	064	178	0.5367
60-78	I Size, Mass, Speed	543	307	177	456	0.6287
79-90*	J Following Instructions, Simple	132	179	740	084	0.6209
92-99	K Color Naming	684	112	366	181	0.6471
100-105	L Color Association	614	154	342	336	0.6303
106-110	M Motion and Direction	438	143	233	534	0.6081
111-118	N Time Vocabulary	464	076	339	579	0.6704
119-123	O Word Association	173	228	202	718	0.6387
124-134	P Following Instruction, Complicated	356	081	595	199	0.5273
135-142	Q Social Roles	152	181	477	655	0.7126
143-148	R Word-action Coordination	237	712	011	161	0.5887
149-161	S Independence & Self-help	115	818	096	094	0.6997
3	DAP Draw a Person	552	350	254	055	0.4948

* Items 37 and 91 were not included in the factor analysis

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Appendix A

Table I

Analysis of Item Difficulty by Age Level and Relationship to Total Score

Item	% Passing			Biserial Correlation with total
	4 years	5 years	6 years	
1. Knows first name	97	97	100	67
2. Knows last name	73	80	83	34
3. Draw a person				61
4. Knows age	76	82	82	51
5. Knows birth date	27	37	33	49
6. Knows address	44	54	71	53
7. Knows school	21	49	57	49
8. Knows teacher's name	76	81	84	42
9. Knows first names of children	74	89	93	54
10. Knows last names of children	12	42	41	47
11. Points to ear	97	99	99	*
12. " " finger	97	99	95	*
13. " " neck	88	94	95	58
14. " " back	97	98	100	*
15. " " eye	100	99	99	*
16. " " elbow	68	76	80	58
17. " " heel	32	66	72	53
18. " " shoulder	68	80	86	45
19. " " eyebrow	68	80	75	28
20. " " knee	85	88	92	43
21. Knows how many eyes he has	91	98	99	62
22. " " " noses " "	94	94	96	50
23. " " " ears " "	100	96	98	65
24. " " " heads " "	94	98	100	47
25. " " " feet " "	91	96	96	68
26. " " " hands " "	94	92	90	59
27. " " " toes " "	00	16	34	49
28. " " " mouths " "	85	93	98	65
29. " " " necks " "	85	94	97	70
30. " " " broken arms he has	35	60	71	50
31. " " " wheels a car has	35	53	82	64
32. " " " " " bicycle has	68	83	89	46
33. " " " " " tricycle "	38	58	70	75
34. " " " " " wheelbarrow has	24	38	53	32
35. " " " " " rowboat has	15	22	18	32
36. Can count out loud.	91	95	98	69
37. Shows corner of paper	41	55	78	70
38. Knows number of corners paper has	30	51	73	72

	4 years	5 years	6 years	Biserial Correlation with Total
39. 2 & 8 Knows which group has more checkers	74	89	95	71
40. 5 & 6 " " " " " "	59	73	85	38
41. 6 & 6 " " " " " "	06	20	33	62
42. Knows which group has fewer checkers	41	60	55	38
43. Gives middle one	47	73	83	85
44. Gives first one	50	65	74	48
45. Gives last one	30	49	62	57
46. Gives second one	24	42	61	53
47. Gives next-to-last one	21	41	49	51
48. Knows first car name	27	33	33	59
49. Knows last car	18	28	33	58
50. Knows what pulls the train (eng. or caboose)	56	70	75	58
51. Knows name of last car (engine or caboose)	50	57	64	50
52. Knows name of circle	91	90	96	38
53. " " " line	74	88	95	43
54. " " " square	62	76	90	49
55. " " " triangle	38	59	67	25
56. Draws line	94	97	100	82
57. " circle	91	94	95	57
58. " square	32	63	77	73
59. " triangle	18	47	68	62
60. Points to one most like wheel	76	94	95	55
61. " " " " " window	76	91	93	40
62. " " " " " piece of string	62	78	75	58
63. " " " " " tent or teepee	50	79	73	73
64. " " " " " ice cream cone	27	38	48	29
65. " " " " " plate/dish	47	66	73	31
66. " " " " " stick	71	84	89	67
67. Knows which is bigger, ball or bicycle	53	81	88	57
68. " " " " tree or flower	68	85	94	57
69. " " " " Telephone or television	71	84	86	53
70. " " " " man or boy	74	84	94	44
71. " " " " mosquito or grasshopper	71	71	71	16
72. " " " " fly or butterfly	94	84	96	12
73. Knows which goes slower, horse or dog	50	59	49	19
74. " " " " car or bicycle	38	67	68	45
75. " " " " train or rocket	41	58	62	18
76. " " is heavier, butterfly or bird	68	82	86	35
77. " " " " brick or shoe	59	84	87	65
78. " " " " feather or fork	53	76	82	46
79. Can close his eyes	91	99	98	*
80. Raise his hand	91	94	99	37
81. Show his teeth	97	99	99	*.
82. Show his fingernails	91	96	99	64
83. Wiggle	71	71	83	51
84. Say "hello" very loudly	62	84	88	47
85. Say " " softly	62	92	90	60
86. Stand up	97	98	97	21

	4 years	5 years	6 years	Biserial Correlation with total
87. Turn around	65	86	96	32
88. Face the door	88	92	95	41
89. Jump	94	97	95	66
90. Sit down	97	99	99	*
91. Names things he eats				36
92. Names red crayola	76	90	94	62
93. " yellow crayola	62	80	89	71
94. " orange "	65	82	84	63
95. " green "	65	78	87	69
96. " blue "	50	72	77	70
97. " purple "	56	62	72	61
98. " brown "	71	82	88	70
99. " black "	82	84	89	74
100. Knows color of fire	61	80	87	37
101. " " " grass	67	87	90	74
102. " " " snow	55	86	88	84
103. " " " carrot	49	70	72	44
104. " " " sky	30	54	66	55
105. " " " night	61	84	88	78
106. Knows which way saw goes	70	76	88	59
107. Knows which way elevator goes	37	39	52	45
108. " " " ferris wheel goes	24	50	66	53
109. " " " phonograph record goes	49	76	86	62
110. " " " waterfall goes	46	60	66	62
111. Knows when he eats breakfast	64	75	77	58
112. " " people go to church	37	56	73	67
113. " what day it is	12	17	24	35
114. " what it is like outside at bedtime	76	91	99	66
115. Know name of hottest time of year	12	39	52	72
116. Knows " " coldest time of year	12	39	53	76
117. " time of year it is now	09	41	53	72
118. " mother uses telephone to call friend	61	83	90	71
119. " where to find lion	31	56	67	62
120. " " " buy gas	69	90	96	59
121. " who to go to if sick	88	90	96	56
122. " where to look for boat	53	76	71	55
123. " " " go to read something	66	81	90	63
124. Can put car on a box	84	87	92	32
125. " " " in a box	94	95	96	18
126. " " " under a box	72	86	77	45
127. " " red car on black box	69	65	67	59
128. " " blue car on green box	61	60	67	57
129. " " yellow car on little box	55	54	52	41
130. " " one car in middle-sized box	43	36	43	34
131. " " all cars on one side & boxes on other	22	38	69	43

Appendix A (cont.)

	4 years	5 years	6 years	Biserial Correleation with total
132. Can put 3 cars in the big box	52	67	49	52
133. " " 2 cars behind box in middle	15	43	49	51
134. " give everything to container	58	73	85	47
135. Knows what doctor does	82	89	96	55
136. Knows what policeman does	79	91	95	30
137. Knows what dentist does	74	73	78	42
138. " " teacher "	85	80	89	51
139. " " father "	88	87	92	52
140. " " nurse "	68	66	82	53
141. " " mother does	91	91	98	50
142. " " soldier does	65	68	78	27
143. Traces successfully	88	90	87	-.05
144. Draws a line from bird to wagon	76	95	95	51
145. " " " " clock to cake	50	35	90	55
146. " " " from dog to boy	56	90	90	55
147. " " " " girl to ball	61	94	90	54
148. " " " " bird to other bird	47	89	89	70
149. Can put on jacket or shirt without help	85	91	89	56
150 Can zip or button jacket	53	76	84	57
151. Wears shoes	100	96	97	31
152. Can put on shoes	67	86	91	37
153. Can put on correct shoes without help	46	59	75	21
154. Can tie shoes	09	30	43	33
155. Can carry out simple verbal instructions pertaining to clothing, etc.	85	90	85	55
156. Can go about home and/or school neighborhood unattended	44	58	64	36
157. Knows meaning of red-green traffic lights	47	54	64	47
158. Can wash hands	100	100	97	42
159. Can wash and dry hands and face	79	93	97	25
160. Notifies teacher of his toilet needs	97	97	96	58
161. Can care for himself in bathroom without help	70	89	93	36

*Correlations were not usually computed when per cent passing was over 97%.

Appendix B

The Preschool Inventory

Administration and Scoring Manual

Materials Needed

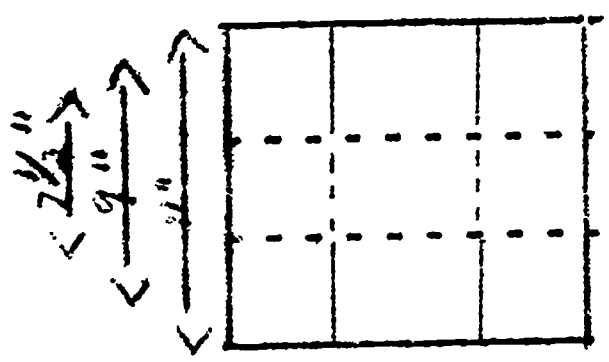
Special equipment needed to administer this procedure has been deliberately kept at a minimum. In addition to this manual and a supply of answer sheets, the only necessary items are:

Three small metal or plastic cars, one each painted red, yellow, and blue.

One box of large (kindergarten size)high-saturation crayons.

One box of checkers, of which 12 red and 2 black will be used.

Three cardboard boxes, which can be made by the examiner from construction paper or light cardboard. To make the boxes, cut a 7½ inch black square, a 9 inch green square, and an 11 inch white square. Make the boxes by folding on the dotted lines, cutting on the solid lines, and holding the sides together with plastic tape or paste, as shown in the accompanying illustration.



Instructions for Administration

The format chosen for the revised version of the scale profited from suggestions made by many of the persons who used the old form during the summer of 1965. The assumption was made that the Inventory would no longer be given in any sort of "total push" program and that all examiners, whether psychologists, teachers, guidance counselors, or trained volunteers, would have ample time to study the manual of instructions sufficiently to be able to administer the Inventory with the help of minimal cues provided on the recording sheet. In order to facilitate this kind of administration, an optical scan answer sheet was de-

signed and printed so that, if desired and if the necessary equipment were available, data cards could be punched directly from the answer sheets. However, it was anticipated that many persons might not have all the necessary electronic equipment and might not wish to put the data on punch cards but would nonetheless wish the obtained data to be easily visualized and summarized. The record sheet so designed attempts to fill the needs of both types of users.

This section of the manual contains both the instructions for administering the Inventory and the ground rules necessary for making scoring decisions, though it is perhaps more traditional to separate procedural guide lines and scoring instructions. However, it appears logical to present them in this way, as it is during the administration of an assessment procedure that an examiner must make the decision as to whether to question further, give additional cues, etc., not during the time that he is evaluating the obtained material. Whenever the asking of additional questions for clarification about a particular item is warranted, one needs the cues for such probing juxtaposed to the instructions for administration, not tucked off in another section of the manual. Also this procedure should help to remove the bete noir of any type of testing procedure--the re-examination of material in order to derive a score. All that will remain to be done after the examiner is finished with a child will be a count of the number of correct items for the factor subtests and the total score.

Cues for what the examiner is to say to the child are printed in upper case letters, with guide lines for administration and scoring procedures in lower case letters. In certain cases the examiner may give instructions other than those specified. These include: (1) when the child does not speak and the examiner is trying to encourage him to speak; (2) when the answer to a question is vague or ambiguous and needs clarification; or (3) when an answer is given which is marginally correct, such as saying "pointer" for "finger". Under such circumstances the examiner may make such comments as "Tell me what you mean by that," or "Tell

me more about it." It is also expected that the examiner will talk to the child about things not connected with the Inventory to help establish or maintain rapport, or make general comments such as "That's very good."

After many of the test items will be found specific answers to the item given as guidelines to help in scoring. These answers are some of those which have been given during experimental administrations of the inventory. These examples will help decide what credit to give to a particular reply. In these examples a vague answer may be followed by a-Q-. This means that the child should be questioned further in order to clarify his answer. For example to the question: WHAT DOES A FATHER DO? A child may answer "work". The examiner may say "TELL ME MORE ABOUT IT," and the child replies "Drives a truck". This is described in the directions for scoring as: "work-Q-drives a truck".

1. WHAT IS YOUR FIRST NAME?

Credit first name only or first and last name. Credit name the child is called by his family (check with teacher or parent), even though this might not appear on the child's record. E.g., credit "Junior" if a check reveals that to be common family designation for the child.

2. WHAT IS YOUR LAST NAME?

Credit last name by which child is known. If this disagrees with records, check before scoring minus.

3. HOW OLD ARE YOU?

Credit correct age if spoken. Correct number of fingers held up does not receive credit but may be questioned with, "How many is that?"

4. WHEN IS YOUR BIRTHDAY?"

Credit correct month or month and date. If child responds with "next week" or "next month" he may be questioned (if correct) by "WHEN IS THAT?"

5 - 8 In these questions any indication showing that the child knows the answer is correct. The clearest indication occurs if the child points or touches the part. Other acceptable designations are mentioned for each item.

5. SHOW ME YOUR EYE. (Credit a prolonged blink, or widening of the eye.)

6. SHOW ME YOUR NECK. (Credit lifting of chin and forward thrust of neck.)

7. SHOW ME YOUR SHOULDER. (Credit turning of one shoulder toward E.)

8. SHOW ME YOUR HEEL. (Credit twisting of foot so that heel moves toward E.)

9 - 12 Point to the following parts of the examiner's body and say, "WHAT'S THIS?" If child gives a marginal answer, such as "What we hear with" for ear, or "pointer" for finger, say "WHAT DO WE CALL IT?" or "WHAT ELSE DO WE CALL IT?" Credit only the correct word.

9. Ear

10. Finger

11. Knee

12. Elbow

Say, "THAT'S GOOD. NOW I WANT YOU TO DO SOME THINGS FOR ME."

13. RAISE YOUR HAND.

Credit raising either or both hands. Any movement of child's hand in upward direction is credited. E.g., if he is resting his elbow on the table and merely elevates the hand, this is sufficient. The hand need not be raised above the head.

14. WIGGLE

Credit any wiggling movement, i.e., body, hand and arm, head and shoulder.

15. SAY "HELLO" VERY LOUDLY. (Do not give item away by changing volume.)

Credit any saying of the word in a voice that is louder than normal.

16. SAY "HELLO" VERY SOFTLY. (Do not change volume.)

Credit any saying of the word in a softer than normal voice.

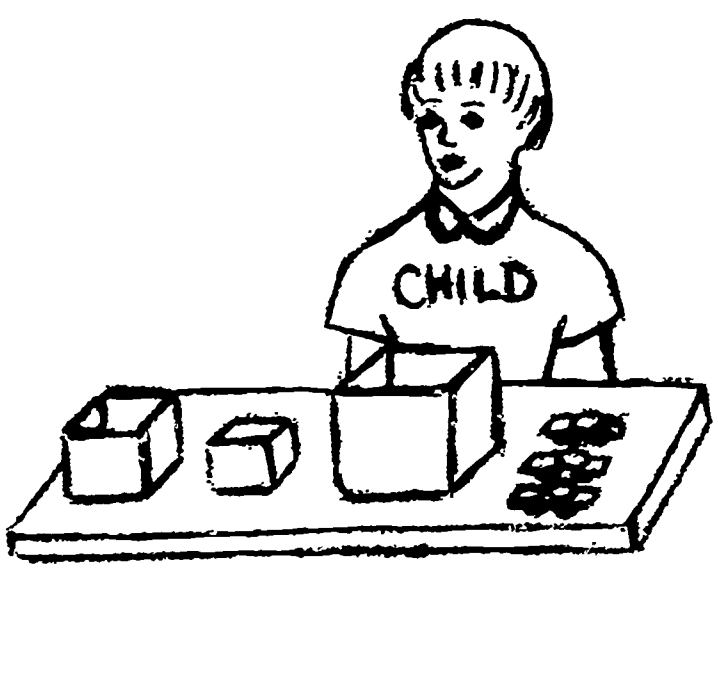
17. NOW STAND UP AND FACE THE DOOR.

Credit if child faces any door.

18. NOW JUMP.

Credit jumping motion in which both feet leave the floor at least a little bit.

19-26 Say "THAT'S VERY GOOD, NOW SIT DOWN IN YOUR CHAIR." Take out the three cars--red, yellow, and blue and the three boxes--black, green, and white. Line the boxes up 2-4 inches apart from left to right in front of the child in the following manner. White box with the open end at the top, black box with the open end down and green box with the open end up. Place all of the cars together to the left of the white box. Make sure all cars and all boxes are visible after each presentation (i.e., do not leave a car in or under a box).



Give each instruction only once. Make sure child is looking and listening and say the words slowly. However, do not give undue vocal emphasis to the key works (e.g., red, on, little). To get credit child must do all steps for each item correctly.

19. PUT THE RED CAR ON THE BLACK BOX.

20. PUT THE BLUE CAR UNDER THE GREEN BOX.

21. PUT THE YELLOW CAR ON THE LITTLE BOX.

22. PUT ONE CAR IN THE MIDDLE SIZED BOX.

23. PUT ALL THE CARS ON ONE SIDE OF THE TABLE AND ALL THE BOXES ON THE OTHER SIDE OF THE TABLE.

24. PUT THREE CARS IN THE BIG BOX.

25. PUT TWO CARS BEHIND THE BOX IN THE MIDDLE
("Behind" may be relative to either examiner or child)

26. GIVE EVERYTHING TO ME.

Child may either nest the boxes, put cars in box, or leave all out. But he must either hand or push all cars and all boxes to or toward E.

27-28. Next, line up 6 red checkers in a row, all touching. Take out two black checkers and stack one on top of the other at one end to make an engine. Say, "LET'S PRETEND THIS IS A TRAIN. YOU KNOW WHAT A TRAIN IS, DON'T YOU? YOU KNOW, IT HAS A LOT OF CARS, ONE AFTER THE OTHER LIKE THIS." (Point to the cars.)

27. DO YOU KNOW WHAT WE CALL THIS FIRST CAR, THE ONE THAT PULLS THE TRAIN? (Point to the engine.)

Credit "Engine" or "Diesel."

28. WHAT DO WE CALL THE LAST CAR ON A FREIGHT TRAIN?

Credit "Caboose."

29-33. These questions require that both a verbal and motor response be given describing the motion requested. In each case probing may be done to elicit both responses. Say "HAVE YOU EVER BEEN ON A SWING? YOU KNOW HOW A SWING GOES--UP AND DOWN AND BACK AND FORTH" The examiner defines this motion with his hands.

29. ALL RIGHT NOW, WHICH WAY DOES A SAW GO?

Credit "Back and forth," "across," "over and over" accompanied by the correct motion. If the child says, "Back and forth" but makes no hand movements, say "SHOW ME." If he moves his hands but says nothing say "WHAT DO YOU CALL THAT MOTION?" In some cases the child may be familiar with only a circular or jig saw. If this appears to be true, give credit if both the correct verbal and gestural responses are given.

30. WHICH WAY DOES AN ELEVATOR GO?

Credit "Up and down," if accompanied by correct motion. If child says either "Up" or "Down" alone, say "TELL ME MORE ABOUT IT." Credit only if both directions are mentioned and described.

31. WHICH WAY DOES A FERRIS WHEEL GO?

Credit "Around," "In a circle" if accompanied by the appropriate circular motion.

32. WHICH WAY DOES A PHONOGRAPH RECORD GO?

Credit "Around," "in a circle," "around and around" etc. if accompanied by correct motion.

33. WHICH WAY DOES A WATERFALL GO?

Credit "Down." Do not credit descriptions such as "In the river."

Questions 34-47 require only a verbal response.

34. WHEN DO WE EAT BREAKFAST?

Credit. "In the morning," "When we get up," "The first meal of the day." "Eight o'clock (or other appropriate time) - Q - in the morning."

No credit for "When we are hungry," "When mommy cooks it," etc.

35. WHAT IS THE TIME OF THE YEAR WHEN IT IS THE HOTTEST?

Credit "Summer" only.

36. WHAT IS THE TIME OF YEAR WHEN IT IS THE COLDEST?

Credit "Winter" only.

37. WHAT TIME OF YEAR IS IT NOW?

Credit the correct season regardless of climate in child's locale.

Do not credit holiday seasonal designations (e.g., "Christmas time").

38. IF YOU WANTED TO FIND A LION WHERE WOULD YOU LOOK?

Credit "Jungle," "Zoo," "Circus" or, in rare cases where lion is the common name for local wild cats, "Woods" or "Mountains" may be correct.

Do not credit "Woods," "Trees" etc. except in the cases mentioned above.

39. IF YOU WANTED TO BUY SOME GAS WHERE WOULD YOU GO?

Credit "Gas station," "Service station," "Garage," "Filling station" or the name of any commercial or local stations such as "Texaco" etc. Do not credit "Gas man," "Gas store" etc.

40. IF YOU WERE SICK WHO WOULD YOU GO TO?

Credit "Doctor" or "Nurse." "My mommy -Q- take me to doctor."

Do not credit "hospital."

41. IF YOU WANTED TO FIND A BOAT, WHERE WOULD YOU LOOK?

Credit "Ocean," "River," "Boat store" or "Marina," etc. "Creek--Q--got rowboat in creek."

Do not credit "Down town" etc.

42. IF YOU WANTED TO READ SOMETHING, WHAT WOULD YOU DO?

Credit "Get a book or magazine," "Go to library," etc.

Do not credit "Read," "Watch T.V."

43-47. Record answers to each of the following items in the space provided on the answer sheet. The answers are scored on two levels depending upon level of abstraction. This will permit qualitative analysis of whether the child perceives these authority figures as "supportive" or "restrictive." Such an analysis does not enter into the point scoring, however, as it did on the original Inventory.

The difference between a "2" and a "1" response depends on whether the child describes a general function of this person in society rather than a specific duty or job. An "0" response is an incorrect one, or one not related to the actual duties of this person as defined by our culture.

43. WHAT DOES A DENTIST DO?

2: "Fixes teeth," "Works on teeth," "Checks you -Q- your teeth, takes care of teeth," "Helps you -Q-fixes teeth."

1: "Drills teeth," "Looks at teeth," "Pulls teeth, "Helps you -Q- pulls teeth."

0: "Checks you," "Checks you -Q- looks at your throat," "Works in a hospital," etc.

44. WHAT DOES A POLICEMAN DO?

2: "Protects us," "Arrests bad people," "Directs traffic," "Helps us -Q- protects us, catches bad guys."

1: "Arrests people," "Helps us -Q- puts people in jail," "Wears gun," "Stops cars," "Shoots bad people."

0: "Shoots you," "Kills you," "Works," "Helps us" -Q- no response.

45. WHAT DOES A TEACHER DO?

2. "Teaches you things," "Learns you to read," "Makes you learn," "Teaches -Q- like reading, and Pledge of Allegiance."

1: "Reads," "Plays with you," "Writes," "Talks to you."

0: "Spanks you," "Gives you milk," "Puts you outside door," "Teaches" -Q- no response.

46. WHAT DOES A FATHER DO?

2: "Takes care of family," "Works -Q- earns money for family," "Brings money home."

1: "Puts you (me) to bed," "Spanks you," "Engineer," "Drives truck," "Works" -Q- no response.

0: "Sleeps," "Watches T.V.," "Drinks beer."

47. WHAT DOES A MOTHER DO?

2: "Takes care of you," "Works - Q - takes care of house." "Works - Q - earns money for family." "Has babies - Q - --raises family."

1: "Makes supper," "cleans the house," "whips you," "tells you to take a nap," "gives you money."

0: "Takes you to the doctor."

48-56. In answering the questions requiring a number as the answer, a child may often hold up the correct number of fingers. If this is done the examiner may say "HOW MANY IS THAT?" A child may also give a correct answer such as "2 in front and 2 in back," if this is done the examiner may say, "HOW MANY ALL TOGETHER?" In both cases if the correct answer is given it is credited.

48-51. Ask the child the questions:
HOW MANY _____ DO YOU HAVE?

48. EYES - Credit 2 only.

49. NOSES - Credit 1 only.

50. HANDS - Credit 2 only.

51. TOES - Credit 10 only.

52-56. Now ask: HOW MANY WHEELS DOES A _____ HAVE?

52. CAR - Credit 4 only

53. BICYCLE - Credit 2 only.

54. TRICYCLE - Credit 3 only.

55. WHEELBARROW - Credit 1 only. (If child says "2" get him to describe and make certain he is referring to the new style.)

56. ROWBOAT - Credit 0 only.

57. LET'S HEAR YOU COUNT OUT LOUD. If no response, start child by saying "ONE - - -" Give credit if child counts to five. If child stops before 5, say, "CAN YOU COUNT ANY MORE?"

58. Hold up a blank piece of paper. Say, "HOW MANY CORNERS DOES THIS SHEET OF PAPER HAVE?"
Credit 4. (Let child count if he can and needs to.)

59-61. Take out the box of 12 checkers, all the same color. Give the child the opportunity to manipulate them briefly. In establishing the groups to be judged, make certain that all the checkers are bunched together, all touching but not lined up, and all flat on the table. Put the checkers in two groups in front of the child and ask, first pointing to the group represented by the first number and then to the other:

59. 2 & 8 WHICH HAS MORE CHECKERS IN IT?
Credit correct response.

60. 6 & 6 WHICH HAS MORE CHECKERS IN IT?
Credit "Both" or "Neither" etc.

61. 2 & 8 WHICH HAS FEWER CHECKERS IN IT?
Credit correct response.

62-66 Take away all but 5 of the checkers. Instruct the child as follows: "PUT THESE CHECKERS NEXT TO EACH OTHER IN A ROW." Following the pattern set by the previous item, the child may have all checkers touching. If so see to it that a half-inch space is left between each two checkers. Give whatever guidance is needed to yield a fairly straight row. Credit first-last in terms of a child's choice -- i.e., either end of the row of checkers with all subsequent choices consistent with that choice. Return the checker to the appropriate place after each response. Credit the correct response. Say:

62. GIVE ME THE MIDDLE ONE.

63. GIVE ME THE FIRST ONE.

64. GIVE ME THE LAST ONE.

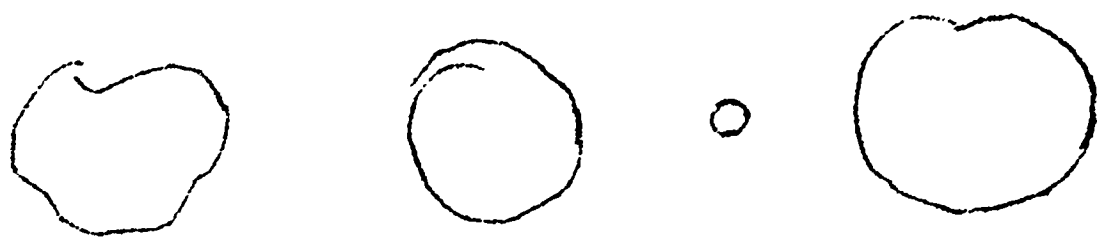
65. GIVE ME THE SECOND ONE.

66. GIVE ME THE NEXT TO THE LAST ONE.

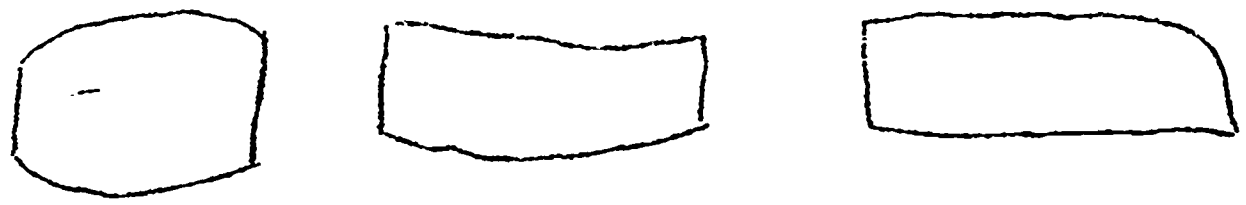
67-70 Give the child the page with the line, circle, square and triangle drawn on it. Say, "NOW I'D LIKE YOU TO MAKE SOME DRAWINGS. MAKE ONE LIKE THIS, (Point to the model) MAKE YOURS RIGHT HERE." (Point to the blank space beside the model). Only one trial is given for each figure. However, if the child spontaneously corrects his own drawing credit is given.

67. Draw a line: Any line, straight or wavy. May be perpendicular to model. Must not return to point of origin.

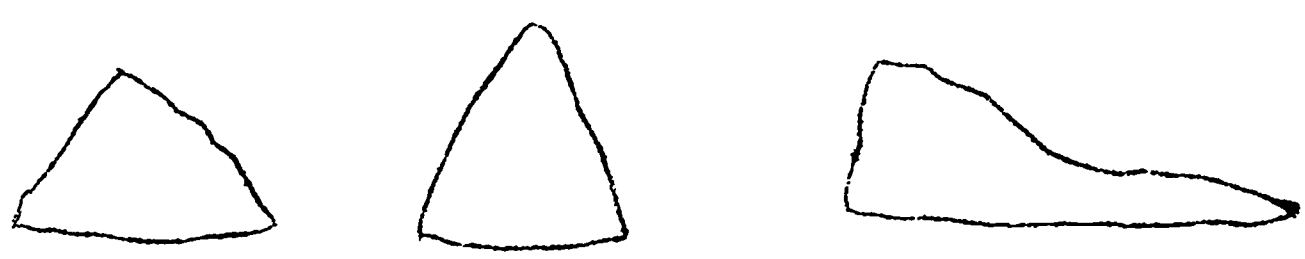
68. Draw a circle: Any two-dimensional figure, closed or nearly closed, which suggests circularity. Repeated circular motions receive no credit.



69. Draw a square: Figure must have at least two angles and the configuration approximately that of a square or rectangle.



70. Draw a triangle: Figure must have at least one angle, no more than three sides, and at least two reasonably straight lines.



71-73. Using the same sheet of geometrical forms, or a clean one if it has been badly scribbled on, say: "WHICH ONE IS MOST LIKE A _____." (If the child gives the correct answer verbally ask him "WHICH ONE OF THESE IS THAT?" (Pointing to the sheet of paper)

71. WHEEL - Credit pointing to the circle.

72. TENT - Credit pointing to the triangle.

73. STICK - Credit pointing to the line.
Take the paper from the child and say: "NOW LISTEN CAREFULLY."

74. WHICH IS BIGGER, A BALL OR A BICYCLE?
Credit bicycle.

75. WHICH IS BIGGER, A TREE OR A FLOWER?
Credit tree.

76. WHICH IS SLOWER, A CAR OR A BICYCLE?
Credit bicycle.

77. WHICH IS HEAVIER, A BRICK OR A SHOE?
Credit brick.

78. WHICH IS HEAVIER, A FEATHER OR A FORK?
Credit fork.

Now place the 8 Crayola crayons (or any other high intensity crayons of red, orange, yellow, green, blue, purple, brown, and black) on the table. Mix them up and line them up about 1/2 inch apart.

79. Credit red only. Point to the red crayon and say, WHAT COLOR IS THIS?

80. Credit black only. " " " black " " " " " " " "

81. WHICH ONE OF THESE IS THE COLOR OF THE SKY? (Point to all colors).
Credit saying blue or pointing to the blue color.

82. WHICH ONE IS THE COLOR OF NIGHT? (Point to all colors).
Credit saying black or purple or pointing to these colors.

Now take the sheet with the line, circle, square and triangle.

83-85 In scoring these items the knowledge of color is the only important thing. If a child selects the correct color he is given credit even if he does not color the correct geometric form. After each response return colors to original position. How well he colors within the boundaries of the form is of no concern.

83. COLOR THE CIRCLE YELLOW.

84. COLOR THE SQUARE PURPLE.

85. COLOR THE TRIANGLE ORANGE.

Scoring Instructions

The optical score record sheets make scoring of the individual items self-evident. All items except Nos. 43-47 are scored as either correct (1 point) or incorrect (0) points). In this scoring schema, no distinction is made between a wrong answer and no answer. Questions 43-47 are scored either 2 or 1, depending on level of abstraction of the response as explained in the section on administration, or zero for incorrect answers or no answers.

The breakdown of the total Inventory into factor scores, with total number of points that can be earned, is as follows:

Item Nos.	Factor	Developmental Area	Possible Score
1-26	3	Personal-social responsiveness	26
27-47	4	Associative vocabulary	26
48-66	1	Concept activation--numerical	19
67-85	1	Concept activation-- sensory	19
1-85			90

Interpretation

At the present time, the slow and systematic standardization of this new form has just begun. However, as it is being used experimentally by workers in many parts of the country, some kind of tentative norms are needed. We have therefore prepared a provisional percentile table for subtests and total score based on 270 children ranging in age from 4-6 to 6-6. It is expected that these norms will be obsolete by the spring of 1966.

Table 1 A. Percentiles for Factor Subtests and Total Score for Four Age Groups

%ile	Personal-Social Responsiveness				Associative Vocabulary			
	4-6 to 5-0	5-1 to 5-6	5-7 to 6-0	6-1 to 6-6	4-6 to 5-0	5-1 to 5-6	5-7 to 6-0	6-1 to 6-6
95	23	24	25	25-26	19	21-22	22-24	23-24
90	22	23	24	24	18	20	21	22
85	-	-	-	-	-	-	20	-
80	21	-	23	-	17	-	-	-
75	20	22	-	23	16	19	19	21
70	-	-	22	-	15	18	18	20
65	19	-	-	-	14	17	-	-
60	-	21	-	22	-	16	17	19
55	18	20	21	-	13	15	16	-
50	17	19	-	21	12	14	-	18
45	-	-	20	20	-	-	-	17
40	-	18	19	19	-	13	15	16
35	16	-	18	-	11	12	13-14	15
30	-	17	-	18	-	11	12	-
25	15	16	17	17	10	10	11	14
20	14	15	16	-	8-9	-	10	13
15	12-13	14	15	16	7	9	9	11-12
10	9-11	11-13	12-14	13-15	5-6	7-8	7-8	8-10
5	< 8	< 10	11	12	4	6	6	7

To use table, determine child's age in years and months. Read child's subtest score in appropriate age column, and locate corresponding percentile in margins.

Table 1 A. (Cont.)

Concept Activation-Number				Concept Activation-Sensory				Total				
4-6 to 5-0	5-1 to 5-6	5-7 to 6-0	6-1 to 6-6	4-6 to 5-0	5-1 to 5-6	5-7 to 6-0	6-1 to 6-6	4-6 to 5-0	5-1 to 5-6	5-7 to 6-0	6-1 to 6-6	%ile
15	16-17	19	19	16	19	19	19	63-71	75-77	78-82	81-84	95
14	15	17-18	18	-	18	18	-	62	73-74	75-77	80	90
13	-	16	17	-	-	-	-	59-61	72	73-74	79	85
12	14	15	-	15	17	-	-	57-58	71	72	78	80
11	13	14	16	14	-	17	18	56	70	71	76-77	75
-	12	13	-	-	-	-	-	54-55	68-69	69-70	74-75	70
-	11	-	15	13	-	-	-	52-53	67	67-68	73	65
10	-	12	14	12	16	16	-	50-51	63-66	65-66	72	60
-	-	-	-	-	-	-	-	49	58-62	64	71	55
9	10	-	13	11	15	-	17	47-48	57	62-63	69-70	50
-	-	11	-	10	-	15	-	45-46	54-56	61	68	45
8	9	-	12	-	14	14	16	44	52-53	60	64-67	40
-	-	-	-	9	12-13	-	15	43	50-51	57-59	62-63	35
7	8	10	-	-	11	13	-	41-42	47-49	54-56	58-61	30
6	7	9	11	8	10	12	13-14	38-40	46	52-53	55-57	25
5	-	-	10	7	-	-	12	36-37	43-45	51	51-54	20
4	-	8	9	6	9	11	11	29-35	39-42	48-50	46-50	15
-	5-6	7	7-8	4-5	7-8	9-10	10	24-28	29-38	42-47	42-45	10
3	4	6	6	3	6	8	9	23	28	41	41	5